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Poliomyelitis

Prevention in travellers

This article is the second in a series providing a summary of prevention strategies and vaccination for infections that may be acquired by travellers. The series aims to provide practical strategies to assist general practitioners in giving travel advice, as a synthesis of multiple information sources which must otherwise be consulted.

Poliomyelitis is a potentially fatal viral illness, which may cause acute flaccid paralysis and permanent central nervous system damage. Ongoing global efforts to eradicate poliomyelitis have been under way since 1988. Travellers are at risk of infection in countries with endemic wild poliomyelitis virus or imported cases, and can spread the infection to areas where poliomyelitis has been eradicated. While all adults should be immune to poliomyelitis, it is important that at risk travellers are vaccinated appropriately. Vaccine options and regions currently reporting poliomyelitis are presented from a number of sources, which may facilitate the process of giving travel advice in a general practice setting, although it is also important to seek up-to-date epidemiological information.

Keywords: travel; health promotion; preventive medicine; immunisation; communicable diseases



Poliomyelitis is an acute illness caused by serotypes 1, 2 or 3 of the poliomyelitis virus, an enterovirus from the family Picornaviridae.¹ Poliomyelitis viruses have a ribose nucleic acid (RNA) genome, and transiently inhabit the gastrointestinal tract. The virus enters the mouth and multiplies in the pharynx and gastrointestinal cells, then enters the blood stream via local lymphoid tissue. It can then invade the central nervous system and multiply in the motor neurons of anterior horn cells of the spinal cord and brain stem, and cells of the roof of the cerebellum and the motor cortex, causing their destruction.¹⁻³

Ninety percent of infections occur in children less than 5 years of age, with most being under 3 years of age.⁴ Most infections are unapparent (72% or more).¹⁻³ A further 5–24% may have a

minor illness with flu-like symptoms including headache, gastrointestinal disturbance, malaise, and neck and back stiffness.^{1,2} Approximately 4% develop nonparalytic poliomyelitis in the form of aseptic meningitis. Less than 1% in total, and 0.5% of infected children, have paralytic disease.^{2,3} Wild poliomyelitis virus type 2 has not been detected globally since October 1999.⁵

Transmission occurs via the faecal-oral and, less commonly, oral-oral routes, the latter in an incubating patient from pharyngeal secretions (droplet spread) or through contaminated food. The virus is shed from the gastrointestinal tract in faeces for several weeks after infection, as well as from the throat. The reservoir for infection is humans, especially children with unapparent infection.^{1,2,4} The incubation period is 3–21 days, with peak infectivity 7–10 days before, to 7–10 days after, the onset of symptoms.¹ Travellers to endemic countries may infect contacts upon their return home, or spread the infection to other areas where poliomyelitis has been eradicated.

Paralytic disease is a complication of poliomyelitis viral aseptic meningitis. Paralysis is usually asymmetrical; deep tendon reflexes are lost, and bladder and bowel dysfunction are common. Paralysis may be spinal (79%), bulbar (2%), or mixed spinal bulbar (19%).^{1,2} Bulbar poliomyelitis causes paralysis of the muscles innervated by the lower cranial nerves and may lead to respiratory failure with aspiration,³ and has a case fatality rate of up to 75%.¹ Medullary infection may present with autonomic manifestations such as bradyarrhythmias and vasomotor changes. Spinal poliomyelitis may affect any muscle from the neck to the extremities, with patchy and usually asymmetric involvement. Decreased consciousness and irritability may be caused by associated encephalitis.³ Infection in childhood is fatal in 2–5% of cases, and 15–30% in adults.¹

Diagnosis is clinical, with retrospective

stool testing or serology.^{5,6} Any case of acute flaccid paralysis should be investigated for poliomyelitis while global eradication is still in progress.² Poliomyelitis virus is detectable from stool specimens for up to 4 weeks after onset of symptoms.⁵

There is no specific treatment for poliomyelitis. Management is focused initially on bed rest with limbs supported in the neutral position, analgesia, ventilation as needed (as respiratory muscles may recover), and careful nursing care with attention to bladder and bowel function and nasogastric feeding.^{3,5} Paralysis is permanent, although after the acute phase, intensive physiotherapy and ongoing support may help to reduce deformity and improve recovery of motor function.^{3,4}

Epidemiology and global poliomyelitis eradication

Before the introduction of poliomyelitis vaccine, infection with poliomyelitis virus was common worldwide, with seasonal peaks and epidemics in summer and autumn in temperate areas.⁵ In Australia, incidence fell sharply after 1952, but epidemics occurred in 1956 and 1961–1962. The last case of wild poliomyelitis in Australia was notified in 2007 due to an importation from Pakistan. Two vaccine associated cases were notified in 1986 and 1995.⁷

The World Health Organization (WHO) global initiative to eradicate poliomyelitis through expanded immunisation was launched in 1988. At the time, 350 000 cases of paralytic poliomyelitis were occurring in 125 countries.²

The eradication program involves immunisation with live, oral poliomyelitis vaccine given in three doses, 4–8 weeks apart, and active surveillance of acute flaccid paralysis. This is the detection of flaccid paralysis of new onset in children under 15 years of age (and any suspected poliomyelitis case in a person of any age), with prompt virological testing to disprove or confirm poliomyelitis virus infection.⁸ The program has been successful, but progress is vulnerable to a range of influences,² with a poliomyelitis resurgence in 21 countries in 2005–2006,⁹ including Indonesia^{1,10} and Yemen,¹⁰ with Nigeria as the primary source.⁵

By 2008, only Afghanistan, India, Nigeria and Pakistan remained poliomyelitis endemic, with

persistent pockets of transmission in northern India, northern Nigeria and the Afghanistan Pakistan border, which are the current focus of the poliomyelitis eradication initiative.¹¹ Cases elsewhere are imported from endemic countries (see *Resources* for more detailed geographical information).

Poliomyelitis free areas include the western hemisphere, the western pacific region including China and Europe. Small outbreaks in the western hemisphere and western Pacific regions were last reported in 2000 in Haiti/Dominican Republic,^{2,12} China,^{9,13} and the Philippines² – mainly from vaccine derived poliomyelitis viruses,² while the European region was certified as poliomyelitis free in 2002.¹

Prevention in travellers

General preventive measures

General preventive measures include hygiene, such as frequent hand washing with soap and water (or, if not available, an alcohol based hand gel), and standard food and water precautions for travellers (see *Resources*). Hand washing is especially important after using the toilet, changing nappies, coughing/sneezing, and before food preparation or consumption.^{5,14}

Vaccination

All persons should be immune to poliomyelitis. In particular, all adults and children travelling to at risk areas should be fully vaccinated against poliomyelitis. Vaccination status needs to be up-to-date for travellers to:

- poliomyelitis endemic areas (Afghanistan, Nigeria, India and Pakistan)
- countries with recent imported cases, or
- countries at risk due to proximity to endemic or recently infected countries.^{12,14}

The following countries are at risk for poliomyelitis virus importation due to their proximity to endemic or recently infected countries: Bangladesh, Bhutan, Burundi, Cameroon, Congo, Djibouti, Equatorial Guinea, Eritrea, Gabon, Gambia, Guinea-Bissau, Mauritania, Namibia, Rwanda, Senegal, Sierra Leone, Somalia, Tanzania, and Zambia.¹⁴ *Table 1* lists countries that have had imported poliomyelitis cases, or cases related to an imported poliomyelitis virus, in the past 2 years.

A number of websites provide regularly updated epidemiological information, and these can be checked close to the time of travel (see *Resources*).

Vaccines

Parenteral inactivated poliomyelitis vaccine

Australia, the United States of America and other countries have adopted the use of inactivated poliomyelitis vaccine (IPV) to eliminate the risks of infection of immunocompromised contacts through faecal viral shedding of a live oral vaccine. Inactivated poliomyelitis vaccine is also more resistant to breaks in the cold chain and has a better seroconversion rate.³ However, the effect of IPV on reduction of intestinal excretion of poliomyelitis virus is limited.⁴

Formulations containing IPV available in Australia are detailed in *Table 2*. Combination vaccines are useful for travellers requiring diphtheria/tetanus/pertussis boosters for travel, or follow current vaccine recommendation for adults for these components (eg. pertussis vaccine for parents or carers of babies).¹

Oral poliomyelitis vaccine

Oral poliomyelitis vaccine (OPV) is no longer available in Australia. Its main advantages in the global setting include low cost, relative ease of administration and the development of intestinal immunity, which is of importance in potential outbreak situations. However, OPV has potential risks. Faecal viral shedding can occur after administration of OPV for up to 6 weeks, and there is a one in 1.4–3.4 million risk of vaccine associated paralytic poliomyelitis.^{1,4,5} In some people with impaired immunity, faecal shedding can occur for several years after OPV and strains may mutate into potentially neurovirulent strains, which have been a source of worldwide outbreaks.¹ The WHO plans to cease the use of OPV once global poliomyelitis eradication is certified.¹

Dosage and administration

- 0.5 mL of IPV (IPOL) or 0.5 mL of the IPV containing combination vaccines. The IPV is given by subcutaneous injection. The IPV containing vaccines are administered

by intramuscular injection. If IPV (IPOL) is inadvertently given intramuscularly, the dose does not have to be repeated¹

- All infants and children should receive a full course of primary vaccination using IPV or IPV containing paediatric formulations of combination vaccines of three doses at 2 month

intervals, and a booster at 4–5 years, as per the Australian Immunisation Schedule (or the relevant catch up schedule)¹

- All unvaccinated or incompletely vaccinated adults should receive a course of three doses of IPV 1–2 months apart,¹ although the Centres for Disease Control (CDC)

recommends the third dose to be given 6–12 months after the second if time permits. If travel is planned in 4–8 weeks, two doses can be given at least 4 weeks apart; if less than 4 weeks, a single IPV dose is recommended.⁵ Every person should be immune to poliomyelitis at this important stage of poliomyelitis eradication^{1,2}

Table 1. Countries reporting cases of poliomyelitis since April 2008

Country	Cases to 7 January 2010	Total in 2009	Total in 2008
India	3	732	559
Nigeria	1	388	798
Pakistan	2	89	117
Chad	1	68	37
Sudan	0	45	26
Guinea	0	41	0
Afghanistan	2	38	31
Angola	0	29	29
Côte d'Ivoire	0	26	1
Benin	0	20	6
Kenya	0	18	0
Niger	0	15	12
Burkina Faso	0	15	6
Central African Republic	0	14	3
Sierra Leone	0	12	0
Mauritania	0	12	0
Liberia	0	11	0
Democratic Republic of Congo	0	3	5
Cameroon	0	3	0
Mali	0	2	1
Burundi	0	2	0
Uganda	0	8	0
Togo	0	6	3
Ghana	0	0	8
Nepal	0	0	6
Ethiopia	0	0	3

Source: WHO. Global Polio Eradication Initiative. Available at www.polioeradication.org/casecount.asp

Table 2. Available vaccine formulations containing IPV

Formulation	Comments
IPV (IPOL®)	0.5 mL prefilled syringe contains poliovirus 40D antigen units of type 1, 8D antigen units of type 2, and 32D antigen units of type 3
Combined vaccines for people ≥8 years of age (Adacel Polio®, Boostrix-IPV®)	Contains: <ul style="list-style-type: none"> • diphtheria, tetanus, acellular pertussis vaccine (dTpa) • IPV

Note: A number of combination vaccines also include IPV, particularly formulations for children aged <8 years for use as part of the Australian Immunisation Schedule

Booster doses

Indications for booster doses in previously immunised adults:

- travel to poliomyelitis endemic/epidemic areas (Table 1)^{1,5}
- health care workers in possible contact with poliomyelitis cases¹
- visa requirement for travellers up to 15 years of age to Saudi Arabia, the Hajj or Umra.¹⁵

Frequency of booster doses

The CDC and WHO recommend a single lifetime booster only.^{4,5,16–18} The National Health and Medical Research Council recommends 10 yearly boosters for those exposed to continuing infection risk.^{1,2} Given the low risk of harm, 10 yearly boosters with IPV are reasonable.² Combination dTpa IPV vaccines can be used where indicated.¹

Contraindications

Inactivated poliomyelitis vaccine can be given to immunocompromised individuals and their household contacts. This includes those infected with human immunodeficiency virus (HIV).²

The only absolute contraindications to IPV (IPOL) or IPV containing vaccines are anaphylaxis following a previous dose, or any component of, the vaccine¹ (including anaphylactic reactions to streptomycin and neomycin given systemically or topically).²

Adverse events

Inactivated poliomyelitis vaccine containing vaccines commonly cause erythema and pain, and occasionally induration at the injection site.^{1,2} Five to 10 percent of young babies commonly develop fever, crying and decreased appetite for up to 24 hours after injection.¹

Use in pregnancy

There is no evidence supporting definite risk to the fetus from IPV administered during pregnancy.

However, fever is considered potentially teratogenic. As this is an uncommon side effect of the vaccine in adults, IPV should only be given to pregnant travellers who are travelling to endemic countries or countries currently reporting cases of poliomyelitis.¹

Summary

Poliomyelitis is a potentially serious, and occasionally fatal, viral infection which can cause central nervous system damage with permanent sequelae.^{1–3,19} Previously widespread, it is now in the final stages of global eradication.^{1,2} It is vital that travellers to endemic countries are fully vaccinated for both personal and public health reasons. Given the constantly changing global situation, it is important to seek up-to-date epidemiological information before travel. Numerous countries have currently or recently reported cases of imported poliomyelitis, although currently, wild poliomyelitis virus is found only in four countries.

The previously fully vaccinated adult traveller can receive a booster of parenteral poliomyelitis vaccine to regain full immunity, while unvaccinated travellers require a full course of immunisation.

Resources

- Detailed geographical information on poliomyelitis: www.poliomyelitiseradication.org/content/general/infecteddistricts.pdf
- Regularly updated epidemiological information to source at the time of travel: www.poliomyelitiseradication.org/casecount.asp, www.cdc.gov/travel/ and www.who.int/csr/don/archive/disease/poliomyelitismyelitis/en/
- Information for travellers on water treatment methods: wwwnc.cdc.gov/travel/content/water-treatment.aspx and www.cdc.gov/crypto/factsheets/filters.html.

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